

Optical Precision Deployment Latch, Phase II

Completed Technology Project (2015 - 2018)



Project Introduction

Virtually all optical information gathering instruments benefit from greater aperture. For space-based instruments whose geometries are constrained by the launch vehicle, increasing the aperture requires deployment of some aspect of the optical train and then the precise and dynamically stable latching of the deployed components into defined positions. Existing latching technology is either too inaccurate, unstable, or expensive for use in many NASA small satellite missions. Physical Sciences Inc. (PSI) has developed a simple, scalable latching technology by applying precision engineering approaches from previous developments that carefully manages the friction and strain energy stored internal to the latching mechanism. This latch was shown to have better than 350 nm repeatability and stability. During the Phase I activities, PSI has also shown that an alternative locking flexure approach could meet the needs of certain deployable optics applications. Both approaches provide a small, low-cost latching system with sub-micron positional repeatability and dynamic stability. During the Phase II efforts, PSI will further explore the performance of the mechanism and flexure approaches and then down-select to one approach for complete development. PSI will integrate the precision deployment lock into a complete set of flexures and mechanisms to provide NASA and other customers with a complete deployment system for a 6U cubesat. In addition to the precision latching components, the team will also address launch restraint, deployment actuation & rate control, and the associated deployment of the sun shade and light baffles that are critical to the operation of any high performance optical spacecraft instrument. The results of the Phase II will be an integrated system that will provide all of the deployable aspects needed for NASA and others to launch, deploy, and operate high performance optical instruments from cubesats, ESPA-sats, and other small spacecraft platforms.



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Table of Contents

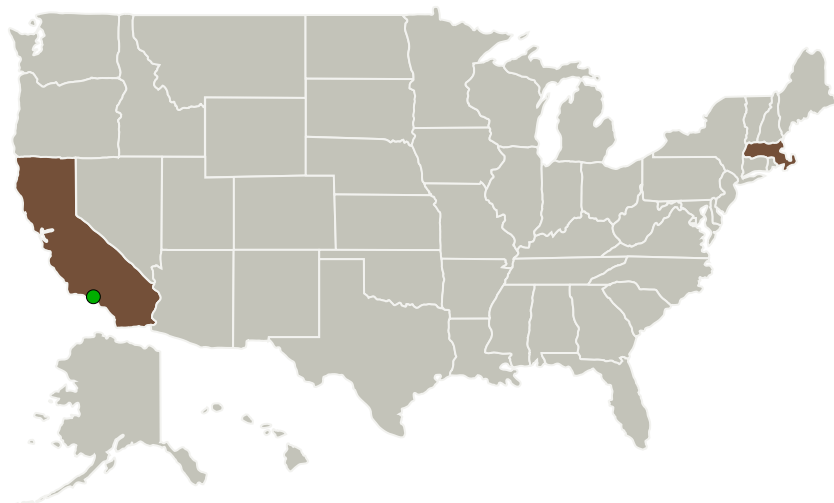
Project Introduction	1
Primary U.S. Work Locations and Key Partners	2
Project Transitions	2
Organizational Responsibility	2
Project Management	2
Images	3
Technology Maturity (TRL)	3
Technology Areas	3
Target Destinations	3

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Primary U.S. Work Locations and Key Partners





Organizations Performing Work	Role	Type	Location
Physical Sciences, Inc.	Lead Organization	Industry	Andover, Massachusetts
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations

California	Massachusetts
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Project Transitions

 **May 2015:** Project Start **May 2018:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137726>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Physical Sciences, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Peter A Warren

Co-Investigator:

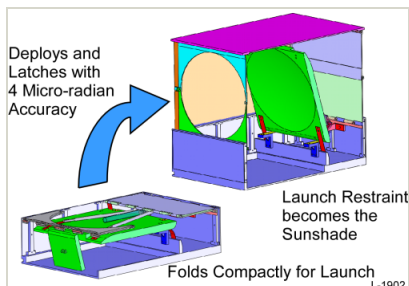
Peter A Warren

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Images



Briefing Chart

Optical Precision Deployment Latch
Briefing Chart
(<https://techport.nasa.gov/image/134320>)

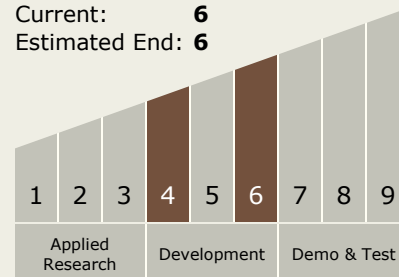


Final Summary Chart Image

Optical Precision Deployment Latch,
Phase II
(<https://techport.nasa.gov/image/126479>)

Technology Maturity (TRL)

Start: 4
Current: 6
Estimated End: 6



Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - TX12.3 Mechanical Systems
 - TX12.3.2 Electro-Mechanical, Mechanical, and Micromechanisms

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System